

WE CLAIM:

1. A disposable syringe comprising:

a needle cannula;

5 a barrel having an inner surrounding barrel wall surface which surrounds an axis and which confines a passage, said passage having open lower and upper ends which are disposed opposite to each other in a longitudinal direction parallel to the axis, said inner surrounding barrel wall surface including a larger-diameter segment and a smaller-diameter 10 segment which confine rear and front passageways respectively, and which are disposed proximate to said open lower and upper ends, respectively, to form a surrounding shoulder portion therebetween, said smaller-diameter 15 segment including a front surrounding region and a rear surrounding region which is proximate to said surrounding shoulder portion, said larger-diameter segment including proximate and distal surrounding regions which are opposite to each other in the longitudinal direction and which are 20 respectively proximate to and distal from said surrounding shoulder portion;

a tubular needle seat including

25 a hub portion disposed to fix said needle cannula therein, and having a surrounding front end wall extending radially relative to the axis,

 a surrounding gripped portion extending from said hub portion in the longitudinal direction and away from said surrounding front end wall, and

an anchoring portion extending from said surrounding gripped portion in the longitudinal direction and away from said hub portion;

5 a grip member disposed to bring said surrounding gripped portion into engagement with one of said rear surrounding region and said proximate surrounding region, said grip member being configured to provide a resisting force that holds said surrounding gripped portion in position so as to prevent movement of said surrounding gripped portion relative to a respective one of said rear surrounding region and said proximate surrounding region during a piercing action of said needle cannula for a hypodermic or intravenous injection, and that permits disengagement of said surrounding gripped portion from said respective one of said 10 rear surrounding region and said proximate surrounding region so as to enable a subsequent movement of said tubular needle seat relative to said inner surrounding barrel wall surface when said grip member is subjected to a first external force;

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20 a plunger which, in a position of use, is disposed to be movable in said larger-diameter segment, said plunger including

25 a plunger body which includes a top end wall movable towards said anchoring portion, a bottom end wall opposite to said top end wall in the longitudinal direction, and extending outwardly of said open lower end so as to be manually operable, and a tubular

intermediate wall that is interposed between said top and bottom end walls, and that confines an accommodation chamber, said top end wall having an inner peripheral edge portion that surrounds the axis, and that defines 5 an access opening therein, which is communicated with said accommodation chamber, and

a coupling rod including

an upper coupling end which is inserted in said access opening, and which has a central anchored area 10 that is engageable with said anchoring portion by a holding force such that the engagement of said central anchored area with said anchoring portion is not disrupted during the disengagement of said surrounding gripped portion from said respective one 15 of said rear surrounding region and said proximate surrounding region, and a surrounding abutment area that surrounds said central anchored area, and that is disposed to be in frictional engagement with said inner peripheral edge portion, such that when said upper coupling end is depressed towards said bottom 20 end wall by virtue of movement of said tubular needle seat relative to said upper coupling end, said coupling rod is disengaged from said inner peripheral edge portion so as to enable said coupling rod to be forced from the position of use to a retracted 25 position where said coupling rod is disposed closer to said bottom end wall, and

a shank portion extending from said upper coupling end towards said bottom end wall and terminating at a thrust end;

5 a biasing member disposed between said shank portion and said tubular intermediate wall to bias said coupling rod towards the retracted position;

a retaining member disposed to retain said thrust end in the position of use against biasing action of said biasing member; and

10 a triggering member disposed to prevent said retaining member from retaining said thrust end in response to a second external force, thereby permitting said coupling rod to be biased towards the retracted position.

2. The disposable syringe according to Claim 1, wherein said 15 tubular intermediate wall has outer and inner tubular wall surfaces opposite to each other in radial directions relative to the axis, said retaining member having a retaining groove which is formed in said inner tubular wall surface, which extends radially and towards said outer tubular wall surface, and which is displaced from said top end wall,

20 said biasing member being a coiled spring that surrounds said shank portion, said coiled spring having an upper end engaging said top end wall, and a lower end that is opposite to said upper end, said lower end being inserted into and being retained in said retaining groove against the biasing 25 action,

said triggering member including an actuated portion

which has a pushed end coupled to and moved with said thrust end, and a pulling end disposed to pull said lower end out of said retaining groove once said pushed end is moved downwardly with said thrust end when said upper coupling end is depressed to be disengaged from said inner peripheral edge, thereby enabling said coupling rod to be forced by virtue of the biasing action to move to the retracted position.

5 3. The disposable syringe according to Claim 1, wherein said biasing member is a coiled spring that surrounds said shank portion, said coiled spring having an upper end engaging said top end wall, and a lower end that is opposite to said upper end,

10 said thrust end having an enlarged end edge which, in cooperation with said shank portion, forms an abutment shoulder for engaging said lower end of said coiled spring,

15 said tubular intermediate wall having outer and inner tubular wall surfaces opposite to each other in radial directions relative to the axis, said outer tubular wall surface having an access hole which extends radially through said inner tubular wall surface,

20 said retaining member having a locking pin which is received in said access hole and which is radially movable between a locking position where said locking pin abuts said enlarged end edge against the biasing action, and a releasing position where said locking pin is retracted to release said enlarged end edge so that said coupling rod is forced by virtue of the biasing action to move to the retracted

position,

5 said triggering member being pivotally mounted on said outer tubular wall surface at a fulcrum point, and including a weight end formed integrally with said locking pin, and a power end disposed at an opposite side of said weight end relative to said fulcrum point so as to be actuated to move said locking pin to the releasing position.

10 4. The disposable syringe according to Claim 1, wherein said proximate surrounding region is formed with a retaining protrusion, said grip member including an outer grip wall surface which is configured to engage retainingly said retaining protrusion with a first frictional force and which is in water-tight engagement with said proximate surrounding region, and an inner grip wall surface which is opposite to said outer grip wall surface in radials direction relative to the axis and which engages retainingly said surrounding gripped portion with a second frictional force that, together with the first frictional force, serves as the resisting force.

15 20 5. The disposable syringe according to Claim 4, wherein said smaller-diameter segment has a shoulder disposed between said front and rear surrounding regions to block forward movement of said surrounding front end wall so as to permit disengagement of said surrounding grip portion from said inner grip wall surface and from said proximate surrounding region when said top end wall is moved to push said grip member towards said surrounding shoulder portion by the first

external force that is greater than the resisting force, thereby enabling the engagement of said central anchored area with said anchoring portion.

6. The disposable syringe according to Claim 5, wherein said central anchored area has an embossed pin which extends toward said anchoring portion so as for insertion thereinto and for retention therein, thereby providing the holding force.

7. The disposable syringe according to Claim 4, further comprising a sealing member which is in air-tight engagement with said rear surrounding region so as to cooperate with said grip member to confine a compressible chamber in said proximate surrounding region, said compressible chamber being filled with a fluid, said hub portion of said needle seat having a through hole which is formed therethrough to be in fluid communication with said compressible chamber such that when said grip member is moved towards said surrounding shoulder portion, said fluid is forced to flow into said through hole to assist in depression of said upper coupling end towards said bottom end wall, thereby speeding up movement of said coupling rod to the retracted position.

8. The disposable syringe according to Claim 4, further comprising a first male screw thread segment and a first female screw thread segment which are respectively disposed on said outer tubular wall surface and said distal surrounding region for providing the second external force by virtue of screw-in engagement of said first male screw

thread segment with said first female screw thread segment.

9. The disposable syringe according to Claim 1, wherein said grip member includes a second female screw thread segment which is disposed on said rear surrounding region, and a 5 second male screw thread segment which is disposed on said surrounding gripped portion, said second male screw thread segment threadedly engaging said second female screw thread segment such that the resisting force is provided between said surrounding gripped portion and said rear surrounding 10 region, and such that screw-out movement of said second male screw thread segment relative to said second female screw thread segment results in disappearance of the resisting force so as to permit disengagement of said surrounding gripped portion from said rear surrounding region,

15 said central anchored area having an engaging recess which confronts said anchoring portion and which extends in the longitudinal direction so as to engage said anchoring portion, and a third female screw thread segment disposed in said engaging recess;

20 said anchoring portion having a third male screw thread segment, rotation of said third male and female screw thread segments relative to each other permitting engagement of said central anchored area with said anchoring portion, thereby providing the holding force.

25 10. The disposable syringe according to Claim 1, further comprising a catheter hub which defines a duct therein, and which includes a sleeve portion that is sleeved on said barrel,

and a tip portion opposite to said sleeve portion along the axis, and a tubular catheter which has a proximate segment that is disposed in said tip portion and that extends along the axis to communicate fluidly with said duct, and a distal segment that extends from said proximate segment along the axis to project outwardly of said tip portion, said needle cannula extending through said tubular catheter to terminate at a tip end that projects outwardly of said distal segment of said tubular catheter.

10 **11.** The disposable syringe according to Claim 1, wherein said barrel has an outer surrounding barrel wall surface which surrounds the axis and which includes front and rear outer surrounding segments that are disposed opposite to said smaller-diameter segment and said larger-diameter segment
15 in directions radial to the axis, respectively, and a rib portion which is disposed on said front outer surrounding segment and which extends in the longitudinal direction, said disposable syringe further comprising a tip protector which is sleeved frictionally on said rib portion so as for
20 shielding said needle cannula.

25 **12.** The disposable syringe according to Claim 11, wherein said outer surrounding barrel wall surface further includes a transition surrounding segment which is interposed between said front and rear outer surrounding segments, and which diverges gradually from said front outer surrounding segment to said rear outer surrounding segment such that extension of said rib portion onto said transition surrounding segment

ensures a firm engagement between said tip protector and said rib portion when said tip protector is brought to be sleeved thereonto.

13. The disposable syringe according to Claim 1, wherein said triggering member is an enlarged end edge which extends from said thrust end of said coupling rod, and which, in cooperation with said shank portion, forms an abutment shoulder for engaging said lower end of said coiled spring, said retaining member having a retaining groove which is formed in said inner tubular wall surface, and a protrusion which is formed on and which extends radially from said enlarged end edge so as to releasably engage said retaining groove.

14. The disposable syringe according to Claim 1, wherein said accommodation chamber includes front and rear chamber regions which are respectively proximate to said top and bottom end walls, said rear chamber region being of a dimension larger than that of said front chamber region so as to clear the way for said biasing member when said biasing member biases said coupling rod towards the retracted position.